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GINNING UP ECONOMIC GROWTH? EVALUATING THE EFFECTS OF COUNTY-LEVEL ALCOHOL SALES

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I. Executive Summary

The academic literature on the topic of legal alcohol sales is vast; from the effects on crime to population health outcomes. The economic development impact of alcohol sales, however, remains relatively unexplored. This research examines county-level data from the State of Arkansas between the years 2009 and 2014 in a cross-sectional time-series regression analysis to determine whether economic development benefits exist that can be attributed either directly or indirectly to legal alcohol sales. Ultimately, this study finds that alcohol sales are positively and significantly related with food service and accommodation employment as well as higher per capita personal income.

II. Introduction

For most Americans, the thought of not being able to buy alcohol where they live is a foreign concept as the vast majority of American counties fully allow the sale of alcoholic beverages. Many states do not even allow counties to have the option to regulate or completely prohibit alcohol sales at all. Of the states that do allow counties to have a say in the matter, counties are generally considered wet if alcohol sales are permitted, dry if alcohol sales are prohibited, and moist if alcohol sales are permitted with some exceptions. The areas with the most dry counties are largely located in the Southern states, which also happen to be some of the poorest areas in the Union. While researchers

have examined some aspects of county-level alcohol sales like the effects on crime, drunk driving accident incidence, and health outcomes, one area that remains relatively unexplored is economic development.

Dry Counties by State, 2017

State	Number of Total Counties	Number of Dry Counties
Arkansas	75	37
Florida	67	3
Georgia	159	5
Kansas	105	19
Kentucky	120	39
Mississippi	82	16
South Dakota	66	1
Tennessee	95	24
Texas	254	7

Source: National Alcoholic Beverage Control Association
http://www.nabca.org/assets/Docs/Research/White%20Papers/WetDry%20Counties.pdf

The main problem in question is: are there statistically significant economic development benefits that can be attributed to a county fully allowing the sale of alcohol? For example, if a dry county votes to become wet, is it reasonable to expect that new establishments will open that would not have opened otherwise? Is it reasonable to expect that new jobs will be created and the unemployment rate will decrease due to the change in alcohol sales? Would a change from dry to wet cause a ripple effect of some sort to other parts of a county's economy?

If it turns out there are, in fact, significant economic development benefits to a county changing its status from dry to wet, then the policy implications are enormous. Dry counties could finally stop losing tax revenue on alcohol sales to their neighbors, new food service establishments would open, jobs would be created, and it could make

the county a more attractive place to live for many. Other potential side effects of going wet, like changing health outcomes and crime, must be considered along with the economic benefits, but the change could have an enormous positive impact on communities that are struggling with business and job growth.

III. Literature Review

An extensive amount of scientific research and academic literature exists that focuses on the effects of alcohol; particularly its biological impact on the human body at the molecular level. Numerous American universities have centers or institutes dedicated to alcohol research and the U.S. National Institutes of Health even has its own National Institute on Alcohol Abuse and Alcoholism; "the largest funder of alcohol research in the world" (niaaa.nih.gov). A related but separate branch of research focuses on certain externalities associated with legal alcohol sales in wet areas as it compares to areas that limit or entirely prohibit alcohol sales.

One of the more popular areas of research regarding the externalities associated with alcohol sales is that of health outcomes. Most of the literature in this area examines the differences between wet and dry areas as it relates to cancers, diseases, and other serious health abnormalities. For example, a notable study published in 1996 by researchers at the University of North Texas set out to determine if, controlling for all other relevant factors, Texas counties that allow the sale of alcohol have higher levels of cirrhosis mortality than those Texas counties that prohibit alcohol sales. The authors concluded that there are, indeed, higher rates of cirrhosis mortality in wet Texas counties

and that hypothetically "revoking a licensed alcohol vendor in the average Texas county, thereby raising the full price of alcohol, will reduce cirrhosis mortality by approximately 0.11 percent" (Brown et al. 1996, 298). A similar 2016 study published in the *British Medical Journal* examined hospital admissions from 2005 to 2010 to determine whether differences existed between residents of wet and dry counties in Texas as it relates to the probability of developing various other maladies. The researchers found that "conversion of counties from dry to wet resulted in statistically significant higher rates of alcohol misuse, alcohol liver disease, atrial fibrillation, and congestive heart failure, with no detectable difference in myocardial infarction" (Dukes et al. 2016). These studies show that, undeniably, negative health externality differences do exist between areas that allow alcohol sales and those that prohibit them.

Another frequently recurring area of research in the literature landscape is the potential for changes in public safety outcomes that are possibly attributable, at least in part, to local legal alcohol sales. For example, researchers in multiple studies have examined the connection between legal alcohol sales and instances of violent crime. One such study examined Kansas county-level data for over thirty years and concluded that there was, in fact, a significant and positive relationship between alcohol sales and violent crime. "Legalizing the sale of alcohol to the general public for on-premises consumption is associated with an 11 percent increase in violent crime" (Anderson et al. 2014). While these findings are concerning, other research shows that alcohol sales can have positive impacts on public safety and crime as well. A 2005 study published by the *Journal of Law and Economics* used a county-level dataset of Texas spanning nearly twenty years to evaluate a link between alcohol sales and illicit drug-related crimes.

Researchers found that the ability to purchase alcohol in a given wet county was related to a significant decrease in the number of crimes involving illicit drugs, as "alcohol access and illicit-drug-related outcomes appear to be substitutes" (Conlin et al. 2005, 215). Another study examined alcohol-related automobile accidents in Kentucky counties from 1991 to 1997 and taking into account whether the counties where accidents happened were wet or dry. Although the study found roughly comparable numbers of accidents across Kentucky over this period, the data established that residents of dry counties were involved in more alcohol-related automobile accidents than their wet county resident counterparts. The authors concluded that because residents of dry counties simply have to drive further to purchase and consume alcohol than residents of wet counties, the amount of time spent on the road is higher and, therefore, the odds of being involved in an accident rise significantly (Gary et al. 2003).

Other literature has attempted to examine, when the option to sell alcohol legally exists, why certain areas may still opt for prohibition. The most common assumption for an area choosing to restrict alcohol sales is often that an area likely has a relatively high percentage of the population that describes itself as culturally conservative or claims to adhere to various religions. While this factor does play a role, some researchers have suggested other factors come into play when citizens decide whether to legally sell alcohol in a given county. A 1988 study published in the journal *Economic Inquiry* found that, often, selling alcohol comes with costs related to state regulation and licensing that residents may not be willing to bear. When it comes to accepting these costs or prohibiting alcohol altogether, "rational voters will choose the option with the lower

relative price" and this factor was ultimately shown "to be more powerful than religious preferences in explaining the pattern of dry counties" (Toma 1988, 507).

While there are, no doubt, many other areas of externalities related to alcohol sales, perhaps one of the most important fields that is surprisingly under researched is economic development. One might be hard-pressed to find academic literature that examines the economic outcome differences between counties that allow alcohol sales and those that prohibit them. This is particularly startling as the areas of America that have historically struggled economically—the South and parts of the Appalachian Rust Belt—also happen to contain the vast majority of America's dry and moist counties (Wheeler 2012). The areas that most need economic development appear to be those that, in large part, limit or prohibit alcohol sales. If legal alcohol sales are the key to economic development and growth, or at least play some significant role in fostering business and job growth, the academic literature landscape does not show it to be so as researchers have left the field almost entirely unexplored. A variety of academic works exploring local economic development more generally, though, provide knowledge as a basis for exploring the externalities of alcohol sales. For example, several commonly accepted local-level factors that influence local economic development are: unemployment rate, race or ethnicity, age, poverty rate, and "the nature of the region in which the locality is located (Bollman 1999, 4-5). This research will attempt to fill the aforementioned vacuum and contribute something meaningful to the academic literature so that citizens can make fully informed decisions on whether or not to allow alcohol sales in their area.

IV. Research Design and Hypotheses

The overall objective of my capstone is to determine whether there is a significant relationship between a county's status as wet or dry (in terms of alcohol sales) and economic development outcomes. Stated another way: if a dry county votes to allow alcohol sales, should the county expect to see economic development benefits that are either directly or indirectly attributable to the new alcohol sales? This research utilizes a cross-sectional time-series (panel data) regression to determine if this relationship exists by examining data from Arkansas from 2009 to 2014. Arkansas serves as an exemplary research subject because the state's 75 counties are divided roughly half-and-half between dry counties and wet counties.

Arkansas Counties (75), 2009-2014

Variable	Mean – Dry Counties	Mean – Wet Counties
Food Svc. Establishments Per Capita	1.355336	1.702442
Food Svc. Employees Per Capita	20.59922	24.84641
Total Establishments Per Capita	17.50682	20.45112
Total Employees Per Capita	222.6402	260.945
Per Capita Personal Income (in dollars)	28,436.57	31,283.40
Unemployment Rate	8.117227	8.880189
Pct. pop. 25+ with Bachelors or Higher	14.0105	14.3816
Rural Urban Code (Scale of 1-9, Higher=more rural)	5.87395	5.377358

Arkansas also has relatively clear-cut alcohol laws, whereas other states may have dry counties with many local wet exceptions. For example, some states like Kentucky have dry counties where the largest city or town within the county is wet, which can make teasing out the true the effects of alcohol sales on economic development quite

difficult. It should be noted that Arkansas does not, like Kentucky, have dry counties with wet exceptions, but rather several wet counties with dry local exceptions (dfa.arkansas.gov). These local dry exceptions are, however, very small townships and communities with very small populations. For this reason, this research classifies counties as either wet or dry rather than moist. Additionally, some Arkansas counties have transitioned from dry to wet in the past decade, so this research aims to capture the economic effects of those changes. A cross-sectional time-series (panel data) regression with fixed effects was selected for this study so as to capture the counties' changes from dry to wet while also accounting for those aspects of a county that are fixed but immeasurable over time. Only six years of data are included due to data availability limitations. Additionally, this method was selected as only five Arkansas counties changed from dry to wet during this time period.

Successfully capturing the economic effects of legal alcohol sales at the county level requires careful selection of available measures. Though other measures of economic development exist, this research utilizes those measures that have both data available for all seventy-five Arkansas counties during the time period selected and a logical link to alcohol sales. The six main county-level dependent variables in question are: food service and accommodation establishments per capita, food service and accommodation employees per capita, business establishments per capita in all sectors, business employees per capita in all sectors, the unemployment rate, and per capita personal income. Common wisdom holds that restaurants make more money off alcohol than food, so the theory behind the first two variables follows that a change from dry to wet could lead to more food service establishments and/or employees. The next three

dependent variables attempt to determine whether legal alcohol sales also potentially cause a multiplier or ripple effect to the rest of the county business community in all sectors. If alcohol sales create new jobs or establishments in the food service and accommodation industries, it is reasonable to expect that these changes will make a given county a more desirable place to live and work, as well as positively impact the county's economy as a whole. Finally, considering per capita personal income could potentially reveal whether or not a county's residents could experience a financial boost some time after legalizing alcohol sales. The independent variables are as follows: median age, a binary variable for a county that began selling alcohol (wet) the previous year or earlier, unemployment rate, per capita personal income in thousands of dollars, percentage of the population 25 and older with a bachelor's degree or higher, the USDA Rural-Urban Continuum Code, and the percentage of the population that is nonwhite. The binary variable for alcohol sales is lagged by at least one year, as it is unreasonable to expect any economic development effects to occur within the same year a county first allows alcohol sales. In the six panel data regression models listed below, all dependent variables except for unemployment rate are expected to have a positive relationship with the lagged variable for legal alcohol sales. Additionally, it should be noted that the per capita dependent variables in models a, b, c, and d are scaled in thousands to make output coefficients in the following tables both larger and easier to read.

a. $$FoodServiceEstablishmentsPerCapita_{i,t} = \alpha_i + \beta_1 MedianAge_{i,t} + \beta_2 CountyWet1YearLag_{(i,t-1)} + \beta_3 UnemploymentRate_{i,t} + \beta_4 PerCapitaPersonalIncome_{i,t} + \beta_5 PctBachelorPlus_{i,t} + \beta_6 RuralUrbanCode_{i,t} + \beta_7 PctNonwhite_{i,t} + \epsilon_{i,t}$$

b. $FoodServiceEmployeesPerCapita_{i,t} = \alpha_i + \beta_1 MedianAge_{i,t} + \beta_2 CountyWet1YearLag_{(i,t-1)} + \beta_3 UnemploymentRate_{i,t} + \beta_4 PerCapitaPersonalIncome_{i,t} + \beta_5 PctBachelorPlus_{i,t} + \beta_6 RuralUrbanCode_{i,t} + \beta_7 PctNonwhite_{i,t} + \epsilon_{i,t}$

c. $TotalEstablishmentsPerCapita_{i,t} = \alpha_i + \beta_1 MedianAge_{i,t} + \beta_2 CountyWet1YearLag_{(i,t-1)} + \beta_3 UnemploymentRate_{i,t} + \beta 4 PerCapitaPersonalIncome_{i,t} + \beta_5 PctBachelorPlus_{i,t} + \beta_6 RuralUrbanCode_{i,t} + \beta_7 PctNonwhite_{i,t} + \epsilon_{i,t}$

d. $TotalEmployeesPerCapita_{i,t} = \alpha_i + \beta_1 MedianAge_{i,t} + \beta_2 CountyWet1YearLag_{(i,t-1)} + \beta_3 PerCapitaPersonalIncome_{i,t}\, \beta_4 PctBachelorPlus_{i,t} + \beta_5 RuralUrbanCode_{i,t} + \beta_6 PctNonwhite_{i,t} + \epsilon_{i,t}$

e. $PerCapitaPersonalIncome_{i,t} = \alpha_i + \beta_1 MedianAge_{i,t} + \beta_2 CountyWet1YearLag_{(i,t-1)} + \beta_3 UnemploymentRate_{i,t} + \beta_4 PTotalEstablishmentsPerCapita_{i,t} + \beta_5 PctBachelorPlus_{i,t} + \beta_6 RuralUrbanCode_{i,t} + \beta_7 PctNonwhite_{i,t} + \epsilon_{i,t}$

f. $UnemploymentRate_{i,t} = \alpha_i + \beta_1 MedianAge_{i,t} + \beta_2 CountyWet1YearLag_{(i,t-1)} + \beta_3 Population_{i,t} + \beta_4 PerCapitaPersonalIncome_{i,t} + \beta_5 PctBachelorPlus_{i,t} + \beta_6 RuralUrbanCode_{i,t} + \beta_7 PctNonwhite_{i,t} + \epsilon_{i,t}$

V. Results

a. Food Service and Accommodation Establishments Per Capita (in 000's)

* indicates $p < 0.10$, **indicates $p < 0.05$

	Coefficient	**Std. Error**	**t**	**P > | t |**
Median Age	**-.0221461**	**.0111487**	**-1.99****	**0.048****
Wet 1 Year Lag	.0907426	.0556369	1.63	0.104
Unemployment Rate	-.0026707	.0067473	-0.40	0.692
Per Capita Pers. Inc. (in 000's of dollars)	.0065203	.0036269	1.80*	0.073*
Pct. Bachelors/Higher	-.0030251	.0065418	-0.46	0.644
Rural Urban Code	.0226332	.0172896	1.31	0.191
Pct. Nonwhite	.00065	.0093343	0.07	0.945

b. Food Service and Accommodation Employees Per Capita (in 000's)
* indicates p < 0.10, **indicates p < 0.05

	Coefficient	**Std. Error**	**t**	**P > | t |**
Median Age	.0785602	.1690862	0.46	0.643
Wet 1 Year Lag	**2.328699**	**.7653613**	**3.04****	**0.003****
Unemployment Rate	-.0699915	.0965345	-0.73	0.469
Per Capita Pers. Inc. (in 000's of dollars)	**.141268**	**.0529019**	**2.67****	**0.008****
Pct. Bachelors/Higher	.0172874	.0983451	0.18	0.861
Rural Urban Code	-.1241648	.2364808	-0.53	0.600
Pct. Nonwhite	.030451	.1322372	0.23	0.818

c. Total Establishments (All Sectors) Per Capita (in 000's)
* indicates p < 0.10, **indicates p < 0.05

	Coefficient	**Std. Error**	**t**	**P > | t |**
Median Age	**-.1996819**	**.0402869**	**-4.96****	**0.000****
Wet 1 Year Lag	-.0873581	.2010486	-0.43	0.664
Unemployment Rate	.013498	.0243818	0.55	0.580
Per Capita Pers. Inc. (in 000's of dollars)	-.0077966	.0131063	-0.59	0.552
Pct. Bachelors/Higher	**-.0781519**	**.0236394**	**-3.31****	**0.001****
Rural Urban Code	.1064461	.0624776	1.70*	0.089*
Pct. Nonwhite	.0006141	.0337304	0.02	0.985

d. Total Employees (All Sectors) Per Capita
* indicates p < 0.10, **indicates p < 0.05

	Coefficient	**Std. Error**	**t**	**P > | t |**
Median Age	-.268504	1.110336	-0.24	0.809
Wet 1 Year Lag	-10.70887	5.544247	-1.93*	0.054*
Per Capita Personal Income (in 000's)	.5150748	.3257823	1.58	0.115
Pct. Bachelors/Higher	.5271659	.6518323	0.81	0.419
Rural Urban Code	-.1092389	1.722812	-0.06	0.949
Pct. Nonwhite	-.4138602	.9246756	-0.45	0.655

e. Per Capita Personal Income (in 000's of dollars)
* indicates p < 0.10, **indicates p < 0.05

	Coefficient	Std. Error	t	P > | t |
Median Age	**1.168738**	**.1537904**	**7.60****	**0.001****
Wet 1 Year Lag	**3.135834**	**.782576**	**4.01****	**0.001****
Unemployment Rate	**-.8040197**	**.0874438**	**-9.19****	**0.001****
Pct. Bachelors/Higher	**.3879096**	**.0931944**	**4.16****	**0.001****
Rural Urban Code	.072655	.2493262	0.29	0.771
Pct. Nonwhite	-.152585	.1338581	-1.14	0.255
Total Establishments Per Capita (in 000's)	-.1232197	.2071358	-0.59	0.552

f. Unemployment Rate
* indicates p < 0.10, **indicates p < 0.05

	Coefficient	Std. Error	t	P > | t |
Median Age	-.0166689	.0877697	-0.19	0.849
Wet 1 Year Lag	.0880771	.4279945	0.21	0.837
Per Capita Personal Income (in 000's)	**-.2573246**	**.0269032**	**-9.56****	**0.000****
Pct. Bachelors/Higher	.0107114	.0504676	0.21	0.832
Population	**.0000784**	**.0000317**	**2.47****	**0.014****
Rural Urban Code	-.0563055	.1324794	-0.43	0.671
Pct. Nonwhite	**.1536931**	**.071084**	**2.16****	**0.031****

VI. Discussion

As the lagged binary variable for county-level alcohol sales is the main explanatory variable of interest, this section will primarily focus on those results that are most relevant. As hypothesized, both food service and accommodation establishments per capita and employees per capita have a positive relationship with the wet one-year lag variable. Food service employees per capita was significant with a t value of 3.04 and

establishments per capita nearly significant at the $p < 0.10$ level. One theory drawn from these results is that alcohol sales may encourage food service and accommodation establishment growth, but even more so encourage the hiring of more employees to staff existing and maybe even expanding establishments. Further research would be required at the individual business level, but this could mean that an existing restaurant, for example, builds a bar within the restaurant and hires bartenders and other bar staff to accommodate patrons seeking libations.

Total establishments in all sectors per capita unexpectedly turned out to be negative, although not significantly so. Perhaps the most unexpected result is the relationship between total employees in all sectors per capita and the lagged wet variable, which was negative and nearly significant at the $p < 0.05$ level. Also interesting, the lagged wet variable had a statistically positive relationship with per capita personal income with a t value of 4.01; nearly equivalent to the effect of a highly educated population (represented by the percentage of the population 25 and older with a bachelor's degree or higher). Although it is tempting to say the hypothesis of alcohol sales could lead to higher rates of per capita personal income, three other independent variables garnered relatively large t values as well, so it is difficult to say which might be the true driver of a causal relationship; if not a combination. Finally, unemployment rate has a positive but statistically insignificant relationship with legal alcohol sales in this research. It should be restated that while many measures of economic development exist, only those measures directly related to the logical effects of alcohol were included in this research. Future studies on this topic should include the six dependent variables used in this research, as well as other broader measures of local economic development.

VII. Limitations

Perhaps the biggest limitation of this research is the amount of data that was available for each variable in the dataset. Data was only available for all of the chosen variables from the years 2009 through 2014. Although ten years or more of data would obviously be preferred for potentially more conclusive results, one can only make the best of what is available. Additionally, three previously dry counties began selling alcohol in 2014, the most at one time in recent history, but the 2015 County Business Patterns data needed to analyze the effects of the one-year lagged alcohol sales variable has not yet been published. Had there been more data available, perhaps a two- or three-year lag variable for alcohol sales would be better suited for inclusion in the model than the one-year lag variable.

Another limitation is simply the relatively small number subjects; the 75 counties of Arkansas. There are plenty of other American counties that prohibit alcohol sales to some degree, but as the laws are often complex and often conflict with local laws, it would be difficult to include those counties in the model. It is possible that some states have some counties similar to those included in this model that are essentially wet or dry, but due to time constraints this research was limited only to the counties of one state that has relatively straightforward alcohol laws. Additionally, alcohol laws at all levels vary greatly by state, so the inclusion of other counties in other states might prove difficult.

Yet another limitation is that the County Business Patterns data from the U.S. Census Bureau features business sector data that combines the food service industry with accommodation and lodging industry into one sector. As alcohol sales are, quite logically, far more associated with food service establishments than hotels and other

accommodation establishments, the relationships between the variables in question could perhaps be even more statistically significant if food service establishment and employee data were provided separate from accommodation data.

Finally, this research initially sought to examine the impact of alcohol sales on a county's total economy by using county-level gross domestic product (GDP), but such data is currently unavailable. The U.S. Bureau of Economic Analysis has suggested that the agency may produce county-level GDP statistics in the future as its benefits include "capturing the local impact of industries" and "revealing long-term trends" (bea.gov). Such a figure may prove more accurate and paint a more complete picture than the dependent variables selected for this research.

VIII. Conclusion

The findings of this research appear to conclude that legal alcohol sales do in fact play some role in local economic growth, but the magnitude of such effects is still ripe for further examination. Lagged alcohol sales are, as hypothesized, positively linked to food service and accommodation establishments and employees per capita, as well as per capita personal income. Lagged alcohol sales are, contrary to the hypothesis, negatively linked to total employees in all sectors per capita. Future research on this topic should expand the models herein to include other independent variables or perhaps other dependent variables like county-level GDP provided such data becomes available. Future research should also expand the scope to more than just one state, if possible. Although it may be difficult to incorporate counties in various states with vastly differing alcohol

laws, doing so could further yield significant insights into the effects of legal alcohol sales on local economic development.

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